

The invention claimed is:

1. A process for treating a naphtha stream comprising the steps of:
 - (a) feeding hydrogen and a naphtha stream containing olefins, diolefins, mercaptans, thiophene, thiophenic compounds and organic nitrogen compounds to a first distillation column reactor;
 - (b) concurrently in said first distillation column reactor:
 - (i) reacting the diolefins with the mercaptans in the presence of a thioetherification catalyst in a distillation reactor zone to produce sulfides, and
 - (ii) separating the naphtha into at least two fractions comprising a first lower boiling fraction having a reduced sulfur content and a first higher boiling fraction containing the sulfides, thiophene, thiophenic compounds and organic nitrogen compounds,
 - (c) removing the first lower boiling fraction from the first distillation column reactor as overheads;
 - (d) removing the first higher boiling fraction from the first distillation column reactor as bottoms;
 - (e) treating the first bottoms to remove organic nitrogen compounds and to produce an effluent having a reduced nitrogen compound content; and
 - (f) feeding hydrogen and the effluent to a hydrodesulfurization reactor containing a hydrodesulfurization catalyst wherein a portion of the sulfides, thiophene and thiophenic compounds are reacted with hydrogen to form hydrogen sulfide.
2. The process according to claim 1 wherein said treating of step (e) comprises feeding the first bottoms to a nitrogen adsorption unit.
3. The process according to claim 1 wherein said hydrodesulfurization reactor comprises a second distillation column reactor and the effluent is concurrently separated into a second lower boiling fraction containing the hydrogen sulfide and a second higher boiling fraction and further comprising the steps of:
 - (g) removing the second lower boiling fraction from the second distillation column reactor as a second overheads;

(h) removing the second higher boiling fraction from the second distillation column reactor as a second bottoms;

(i) combining and feeding said second overheads and said second bottoms to a hydrogen sulfide separation vessel wherein the hydrogen sulfide is separated as a gas from a liquid effluent;

(j) feeding hydrogen and the liquid effluent from the hydrogen sulfide separation vessel to a polishing reactor containing a hydrodesulfurization catalyst wherein additional sulfides, thiophene and thiophenic compounds are reacted with hydrogen to form hydrogen sulfide and a reduced sulfur effluent; and

(k) separating the hydrogen sulfide from the reduced sulfur effluent.

4. The process according to claim 3 wherein said first distillation column reactor contains two beds of thioetherification catalyst in said distillation reaction zone and a mid range boiling fraction containing thiophene is removed from between said beds and combined with said liquid effluent from said hydrogen sulfide separation vessel and fed to said polishing reactor.

5. The process according to claim 2 wherein said adsorption unit comprises solid particulate materials capable of selectively adsorbing organic nitrogen compounds.

6. The process according to claim 5 wherein said solid particulate materials capable of selectively adsorbing organic nitrogen compounds comprise alumina, acid white clay, Fuller's earth, active carbon, zeolites, hydrated alumina, silica gel, ion exchange resins and mixtures thereof.

7. A process for treating a naphtha stream comprising the steps of:

(a) feeding hydrogen and a naphtha stream containing olefins, diolefins, mercaptans, thiophene, thiophenic compounds and organic nitrogen compounds to a first distillation column reactor containing two beds of thioetherification catalyst;

(b) concurrently in said first distillation column reactor:

(i) reacting the diolefins with the mercaptans in the presence of the thioetherification catalyst in a distillation reactor zone to produce sulfides, and

(ii) separating the naphtha into at three fractions comprising a first lower boiling fraction having a reduced sulfur content and a first higher boiling fraction containing the sulfides, thiophenic compounds and organic nitrogen compounds and a mid boiling range fraction containing thiophene;

(c) removing the first lower boiling fraction from the first distillation column reactor as overheads;

(d) removing the first higher boiling fraction from the first distillation column reactor as bottoms;

(e) removing the mid range boiling fraction intermediate said two beds and containing thiophene and a side draw;

(f) feeding the first bottoms to a nitrogen adsorption unit wherein organic nitrogen compounds are removed from said bottoms to produce a first effluent having a reduced nitrogen compound content; and

(g) feeding hydrogen and the first effluent to a second distillation column reactor containing a hydrodesulfurization catalyst;

(h) concurrently in said second distillation column reactor;

(i) reacting the sulfides and thiophenic compounds with hydrogen to form hydrogen sulfide and

(ii) separating the first effluent into a second lower boiling fraction containing the hydrogen sulfide and a second higher boiling fraction;

(i) removing the second lower boiling fraction from the second distillation column reactor as a second overheads;

(j) removing the second higher boiling fraction from the second distillation column reactor as a second bottoms;

(k) combining and feeding said second overheads and said second bottoms to a hydrogen sulfide separation vessel wherein the hydrogen sulfide is separated as a gas from a liquid effluent;

(l) feeding hydrogen, the liquid effluent from the hydrogen sulfide separation vessel and said side draw to a polishing reactor containing a hydrodesulfurization

catalyst wherein additional sulfides, thiophene and thiophenic compounds are reacted with hydrogen to form hydrogen sulfide and a reduced sulfur effluent;

- (m) separating the hydrogen sulfide from the reduced sulfur effluent; and
- (n) combining said reduced sulfur effluent with said first overheads.

8. In a process for treating a naphtha stream comprising the steps of:

(a) feeding hydrogen and a naphtha stream containing olefins, diolefins, mercaptans, thiophene, thiophenic compounds and organic nitrogen compounds to a first distillation column reactor;

(b) concurrently in said first distillation column reactor:

(i) reacting the diolefins with the mercaptans in the presence of a thioetherification catalyst in a distillation reactor zone to produce sulfides, and

(ii) separating the naphtha into at least two fractions comprising a first lower boiling fraction having a reduced sulfur content and a first higher boiling fraction containing the sulfides, thiophene, thiophenic compounds and organic nitrogen compounds,

(c) removing the first lower boiling fraction from the first distillation column reactor as overheads;

(d) removing the first higher boiling fraction from the first distillation column reactor as bottoms;

and

(e) feeding hydrogen and the effluent to a hydrodesulfurization reactor containing a hydrodesulfurization catalyst wherein a portion of the sulfides, thiophene and thiophenic compounds are reacted with hydrogen to form hydrogen sulfide;

wherein the improvement comprises feeding the first bottoms to an organic nitrogen compound treatment unit wherein organic nitrogen compounds are removed from said bottoms to produce an effluent having a reduced nitrogen compound content.

9. The process according to claim 8 wherein said treating of step (e) comprises feeding the first bottoms to a nitrogen adsorption unit.

10. The process according to claim 9 wherein said adsorption unit comprises solid particulate materials capable of selectively adsorbing organic nitrogen compounds.

11. The process according to claim 10 wherein said solid particulate materials capable of selectively adsorbing organic nitrogen compounds comprise alumina, acid white clay, Fuller's earth, active carbon, zeolites, hydrated alumina, silica gel, ion exchange resins and mixtures thereof.